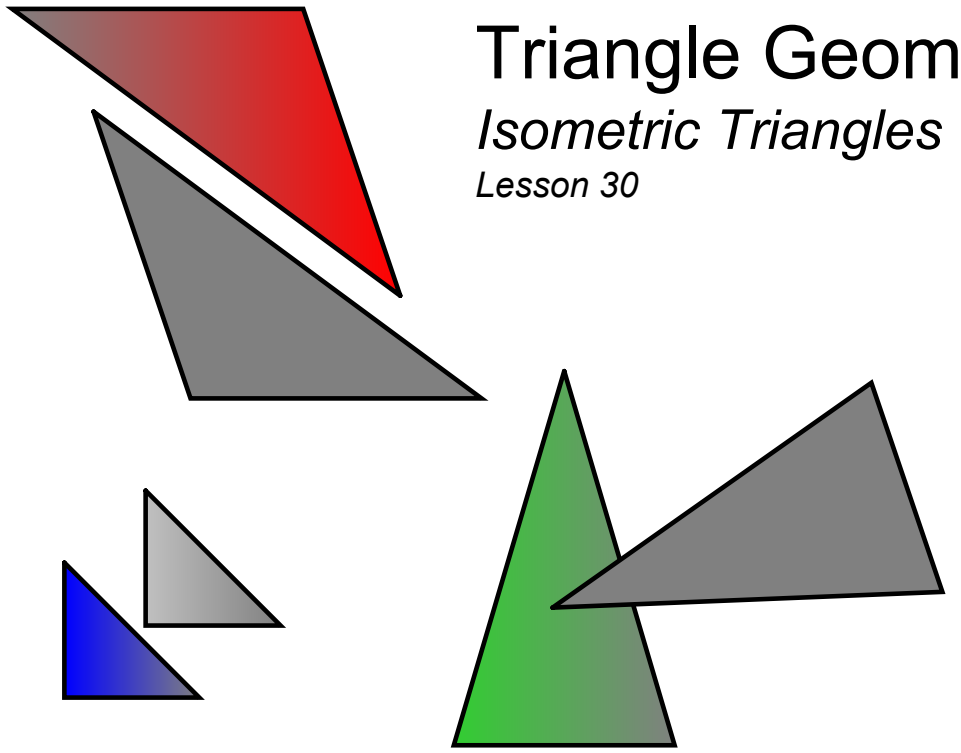


Triangle Geometry

Isometric Triangles

Lesson 30

Mar 22-8:37 PM

Triangles that have exactly the same size and shape are called

congruent triangles.

The symbol for congruent is $\cong$.

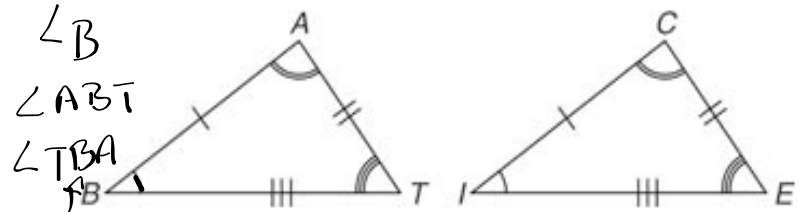
Two triangles are congruent when the three **sides** and the three **angles** of one triangle have the same measurements as the three sides and the three angles of another triangle.

Mar 22-8:38 PM

Congruent
means the same thing as
Isometric

Mar 22-8:40 PM

These two triangles are **congruent**



∠B
∠ABT
∠TBA
vertex

Can you identify the ***corresponding*** sides by letters?

$\overline{BT} \cong \overline{IE}$ $\overline{BA} \cong \overline{IC}$ $\overline{AT} \cong \overline{CE}$

Can you identify the ***corresponding*** angles by letters?

$\angle ABT \cong \angle CIE$ $\angle ATB \cong \angle CET$

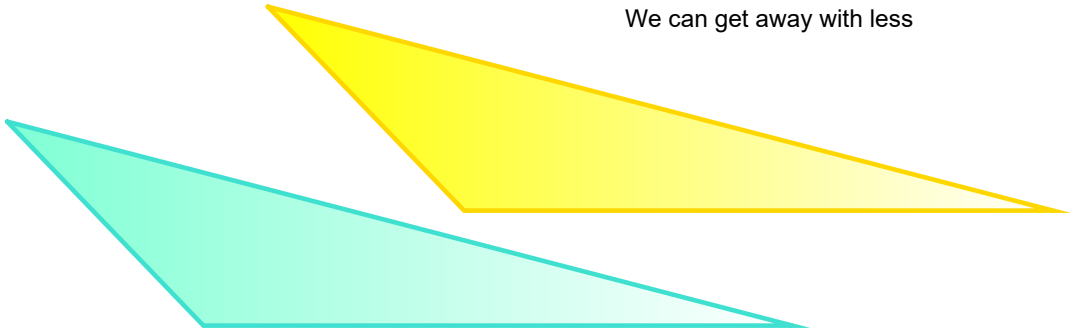
$\angle BAT \cong \angle ICE$

Mar 22-8:42 PM

There are **minimum** conditions for proving that two triangles are congruent.

In other words, it is not necessary to prove that ALL three sides and ALL three angles are congruent **every time** we want to prove that two triangles are congruent.

We can get away with less



Mar 22-8:56 PM

3 ways to prove that triangles are congruent:

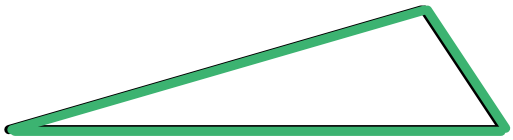
1. SSS side-side-side
2. SAS side-angle-side
3. ASA angle-side-angle

Mar 22-9:35 PM

1. Proving triangles are congruent by **SSS**

side-side-side

Take three black "sticks" and form a triangle with them



Take the same three green "sticks" and form a triangle with them that is different from the black one, if possible

Are these two triangles isometric? Are the corresponding angles in these triangles congruent?

Mar 22-8:59 PM

We do not need to **KNOW** that

- all three corresponding angles and that
- all three corresponding sides are congruent to prove that the triangles are congruent....

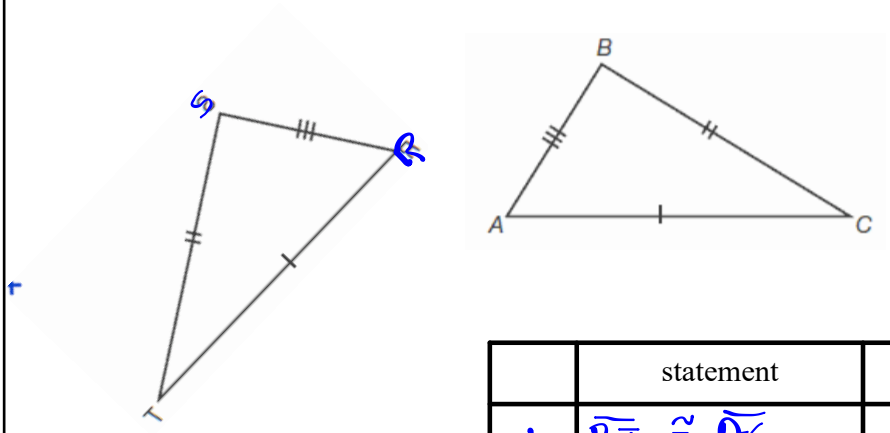
If three corresponding SIDES are congruent then the corresponding ANGLES will be HAVE to be congruent.

Therefore, **SSS** (side-side-side) is "ENOUGH" or sufficient proof to say that **<u>everything</u>** about the triangles are congruent.

Mar 22-9:11 PM

Prove that the following two triangles are congruent.

This is how you do a formal proof



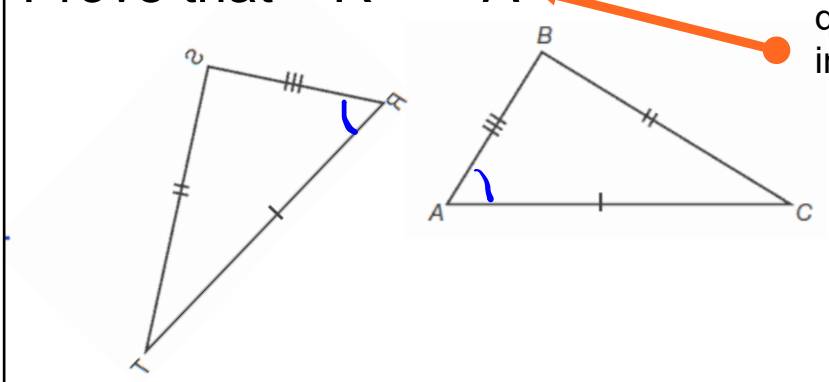
	statement	justification
1	$\overline{RT} \cong \overline{AC}$	Given
2	$\overline{ST} \cong \overline{BC}$	Given
3	$\overline{RS} \cong \overline{AB}$	Given
4	$\triangle RST \cong \triangle ABC$	SSS

Mar 22-9:15 PM

Example of a question:

Prove that R A

This is an example of a question you may get in your homework



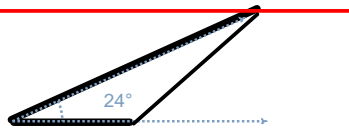
	Statement	Justification
1		
2		
3		
4		SSS
5	$\angle R \cong \angle A$	Corr angles in Congruent $\triangle$s

Mar 22-9:15 PM

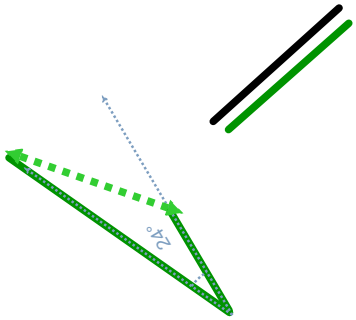
2. Proving triangles are congruent by **SAS**

side-angle-side

Take two black "sticks" and an angle and form a triangle with them--the angle must be **contained** by the two sides



Take the same two green "sticks" and angle and form a triangle with them that is different from the black one, if possible



Are the corresponding angles in these triangles congruent?
Are the corresponding sides in these triangles congruent?

Are these two triangles isometric?

Mar 22-9:39 PM

We do not need to **KNOW** that

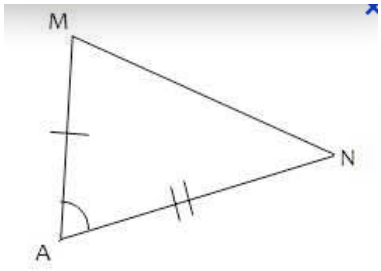
- all three corresponding angles and that
- all three corresponding side are congruent to prove that the triangles are congruent....

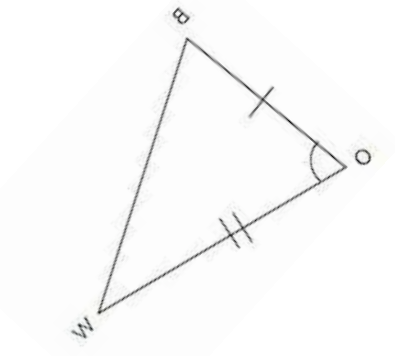
If two corresponding SIDES are congruent and the corresponding ANGLE **contained** by these sides are congruent, then the third corresponding sides and the other corresponding 2 angles will HAVE to be congruent.

Therefore, **SAS** (side-angle-side) is "ENOUGH" or sufficient proof to say that **<u>everything</u>** about the triangles are congruent.

Mar 22-10:31 PM

Prove that the following two triangles are congruent.



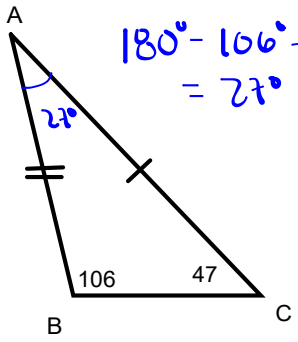


		statement	justification
S	1	$\overline{AM} \cong \overline{BO}$	Given
A	2	$\angle A \cong \angle O$	"
S	3	$\overline{AW} \cong \overline{BO}$	"
	4	$\triangle AMW \cong \triangle BOW$	SAS

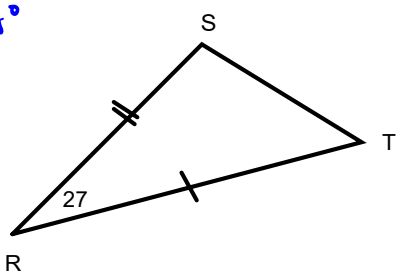
Mar 23-9:55 AM

Example of a question:

Prove that $\overline{BC} \quad \overline{ST}$



180° - 106° - 47°
= 27°

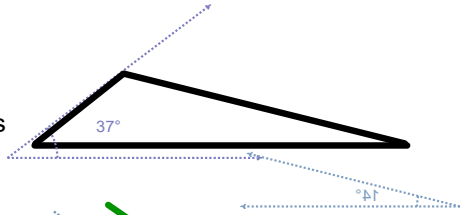


		Statement	Justification
S	1	$\overline{BA} \cong \overline{RS}$	Given
A	2	$\angle A \cong \angle R$	$\sum \angle \Delta = 180°$
S	3	$\overline{AC} \cong \overline{RT}$	Given
	4	$\triangle ABC \cong \triangle RST$	SAS
	5	$\overline{BC} \cong \overline{ST}$	Corr sides in $\cong \Delta$

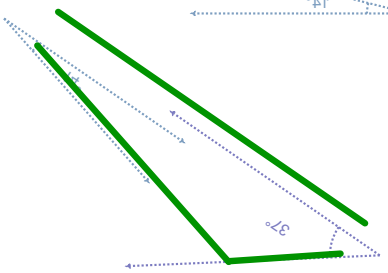
Mar 22-10:44 PM

3. Proving triangles are congruent by **ASA**
angle- side-angle

Take one black "stick" and 2 angles and form a triangle with them--the side must be **contained** by the two angles



Take the same green "stick" and 2 angles and form a triangle with them that is different from the black one, if possible



Are the corresponding angles in these triangles congruent?

Mar 22-10:54 PM

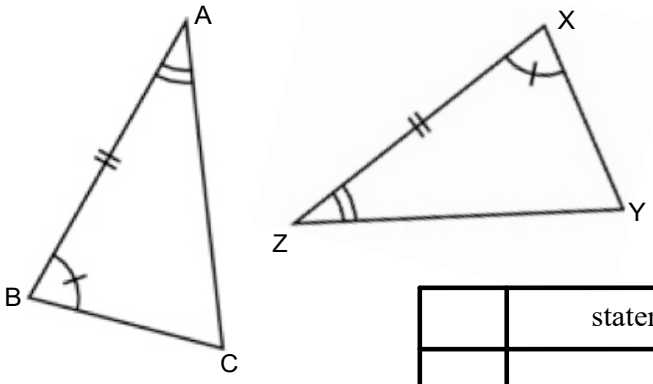
We do not need to **KNOW** that
- all three corresponding angles and that
- all three corresponding sides are congruent to prove that the triangles are congruent....

If two corresponding ANGLES are congruent and the corresponding SIDE **contained** by these angles are congruent, then the third corresponding angle and the 2 other corresponding sides will HAVE to be congruent.

Therefore, **ASA** (angles-side-angle) is "ENOUGH" or sufficient proof to say that **everything** about the triangles are congruent.

Mar 22-11:05 PM

Prove that the following two triangles are congruent.

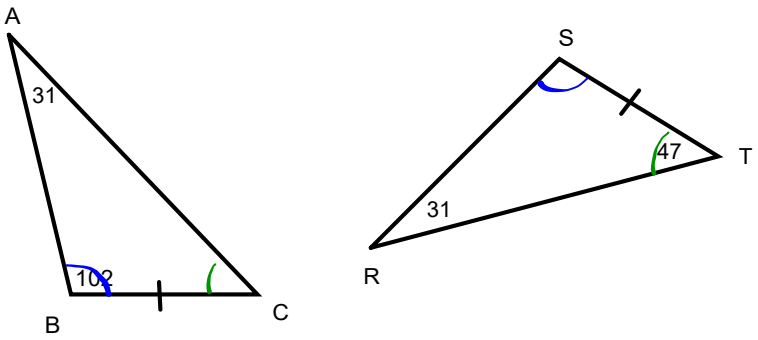


	statement	justification

Mar 22-11:07 PM

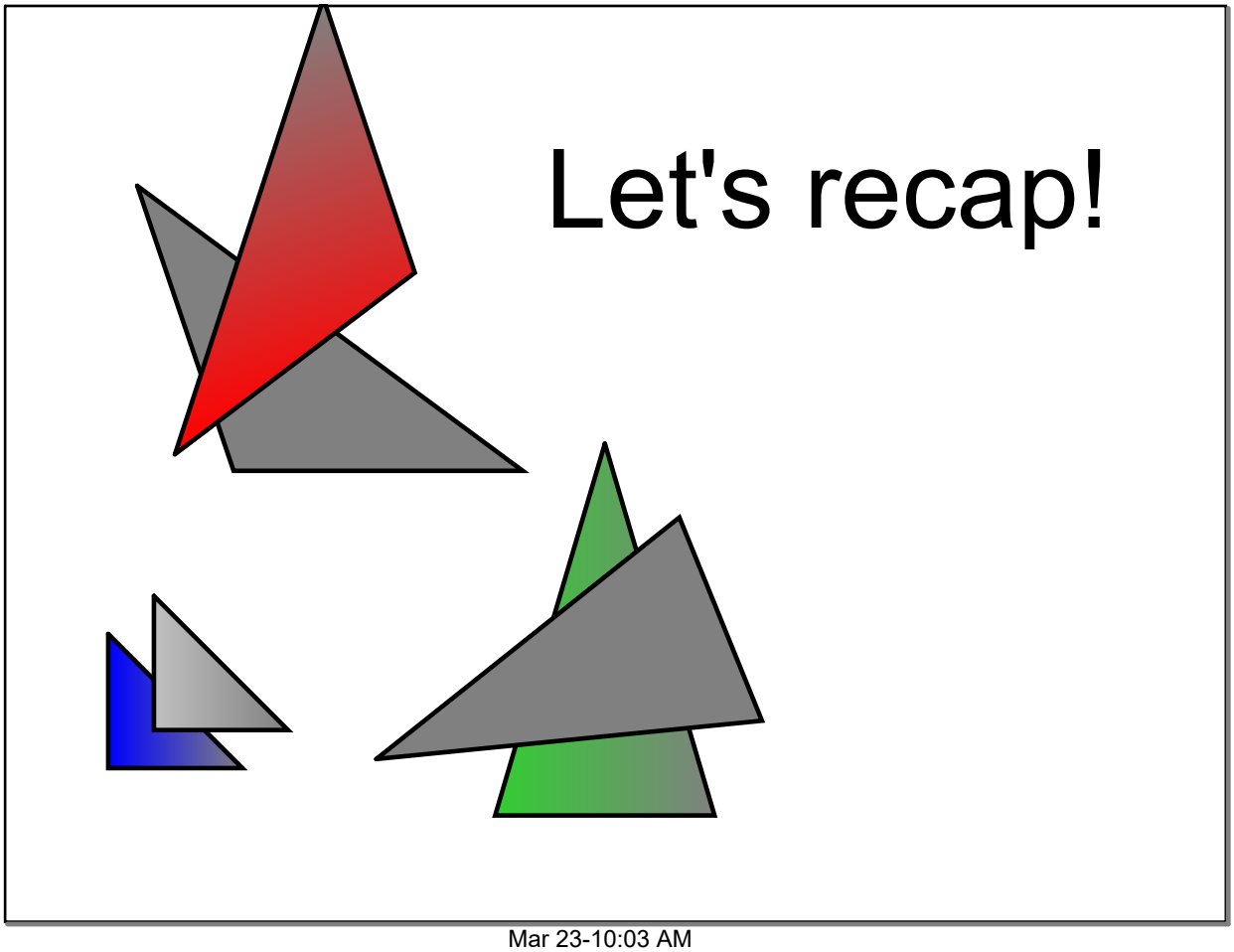
Example of a question:

Prove that $\overline{AB}$ $\overline{SR}$



	Statement	Justification

Mar 22-11:12 PM



Mar 23-10:03 AM

ISOMETRIC TRIANGLES

1. Theorem of Congruence SAS: Two triangles with corresponding congruent angle **contained** between two congruent corresponding sides are isometric.

2. Theorem of Congruence ASA: Two triangles with corresponding congruent side **contained** between two congruent corresponding angles are isometric.

3. Theorem of Congruence SSS: Two triangles with corresponding congruent sides are isometric.

When 2 triangles are proven to be ISOMETRIC, their corresponding elements are ISOMETRIC Property of Congruent Triangles --PCT

Mar 22-4:15 PM

Workbook
P.195 #1,2,3
P.196 #5
P.197 #7
P.198 #8,9

Mar 29-2:51 PM

Mar 23-10:05 AM